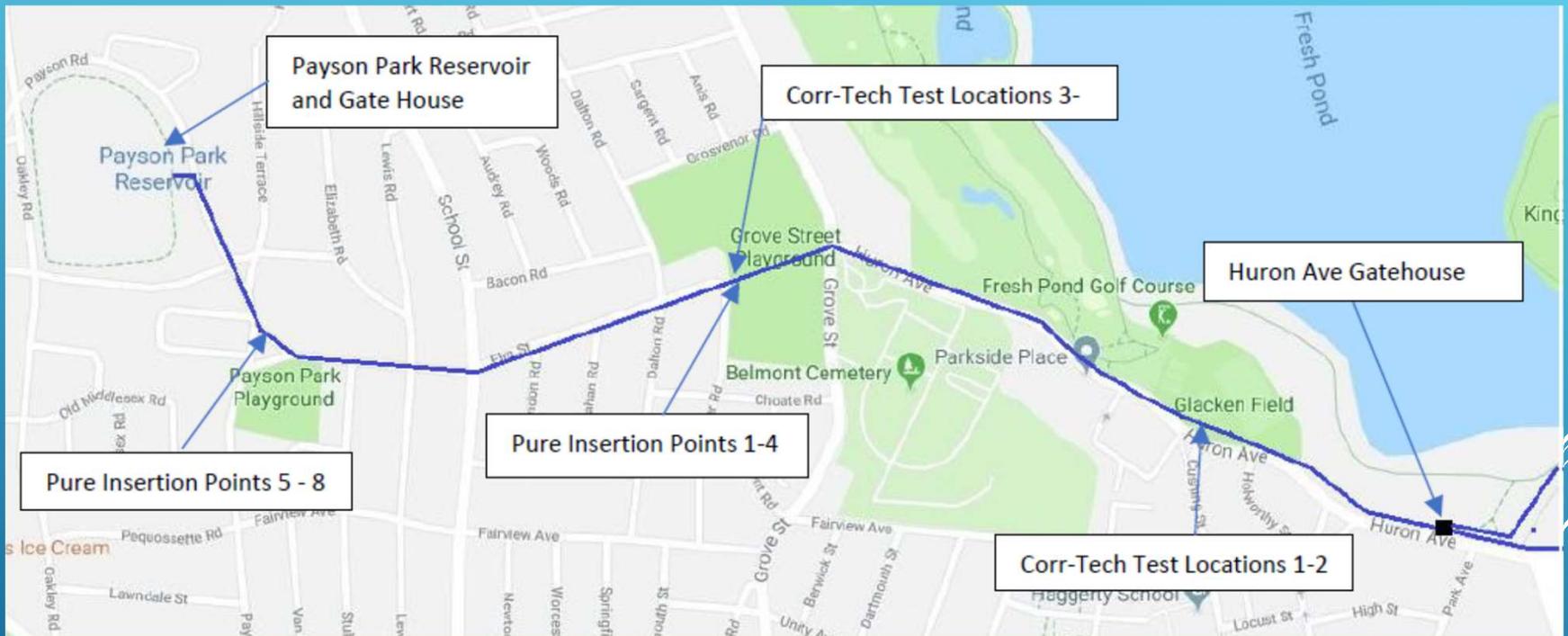


CWD - PAYSON 40" TRANSMISSION MAINS PIPE CONDITION ASSESSMENT STUDY

Corr-Tech Impressed Current Cathodic Protection
Evaluation and Pipe Wall Structural Reliability Assessment

Pure Technologies Sahara Probe - Acoustic and CCTV
Internal Pipe Leak Detection and Visual Inspection



CORR-TECH

IMPRESSED CURRENT

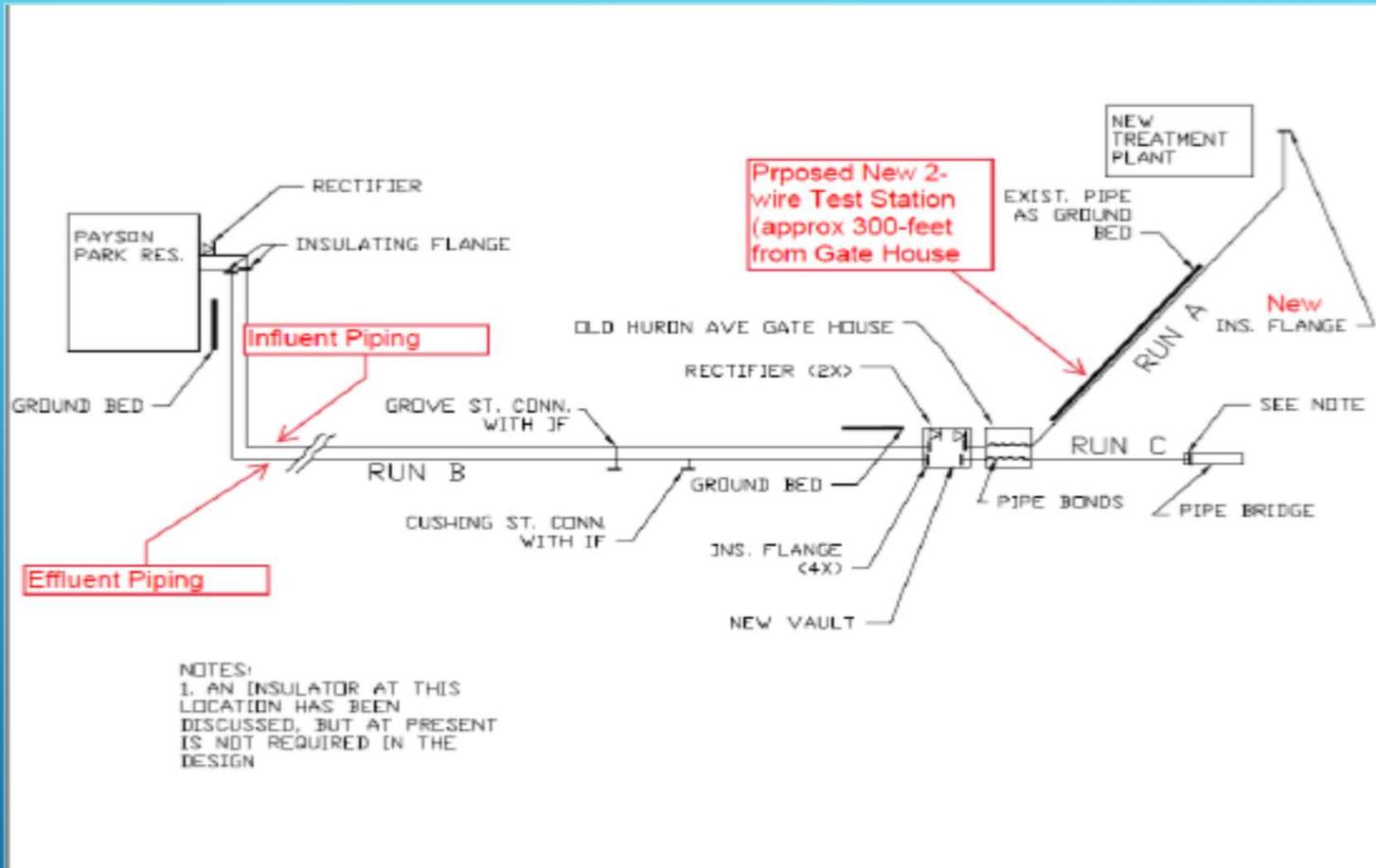
CATHODIC PROTECTION (ICCP)

ASSESSMENT

INTRODUCTION

On May 16th, 2018, CorrTech engineers performed cathodic protection system evaluations on the twin 40-inch riveted steel water mains that extend from the Cambridge Water Treatment Plant to the Payson Park Reservoir. The twin 40-inch riveted steel pipes were installed in approximately 1900 and considered to be poorly coated. The piping network consists of three (3) separate pipe runs, designated as Runs A, B and C, with two (2) Impressed Current Cathodic Protection (ICCP) rectifiers. The rectifier associated with “Run A” and “Run C”, is located inside the Old Huron Ave gate house building. The second rectifier, which is associated with pipe “Run B”, is located inside the Payson Park Reservoir building. Please refer to attached sketch for system layouts.





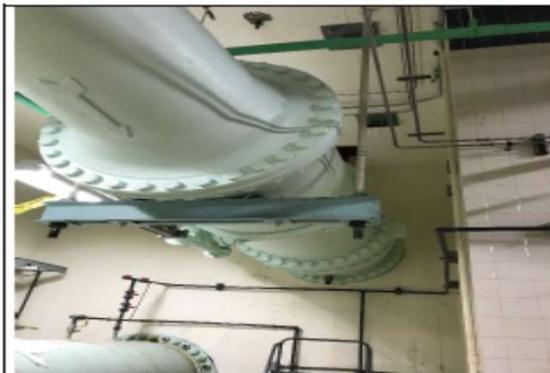
Corr-Tech CWD Impressed Current Cathodic Protection Diagram



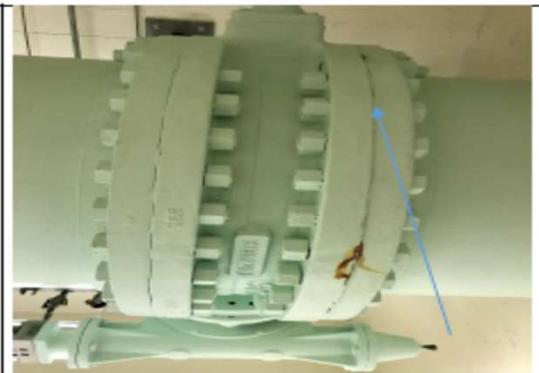
Huron Ave Vault, Insulator Kit on Floor at Flange



Huron Ave Vault, Electrical Continuity Bond



Pipe "Run A" at Water TP Basement where insulator is recommended to be installed



Pipe "Run A" at Water TP Basement where insulator is recommended to be installed

CORR-TECH

ULTRASONIC WALL THICKNESS
AND SOIL CORROSIVITY TESTING





CWD CREW EXPOSING THE PAYSON
LINES FOR CORR-TECH – GLACKEN FIELD



CORR-TECH SETTING UP GRID PATTERN FOR
ULTRASONIC PIPE WALL THICKNESS TESTING
NOTE – WE COULD STILL SEE THE GRID
FROM PREVIOUS 1999 STUDY!



CORR-TECH PERFORMING ULTRASONIC TESTING AT GROVE PARK BELMONT

GLACKEN FIELD



General View of Open Trench



Pipe Grids setup for UT Survey



Pipe close-up, 270 mil gouge



Pipe close-up of rivet seam

Soil samples taken at Elm and Foster excavation were tested and determined to be noncorrosive with a corrosivity index value of four (4).

Soil samples taken Glacken Field excavation were tested and determined to be moderately corrosive with a corrosivity index value of negative two (-2) and negative three (-3).

Corrosivity Index	Corrosivity
≥ 0	Non-corrosive
-1 to -4	Moderately corrosive
-5 to -10	Corrosive
< -10	Very corrosive

CORR-TECH RECOMMENDATIONS

Significant wall thickness presently remains at all pipe sections tested. Pitting ranges and thinning of wall thicknesses have not significantly increased since the inspection performed in 1999 at approximately the same locations. Based on the two excavations and direct assessments performed, structural lining or replacement of these main is not necessary at this time.

The existing cathodic protection system should be repaired or replaced to mitigate corrosion on external below grade surfaces.

PURE TECHNOLOGIES

SAHARA PROBE - ACOUSTIC
AND CCTV INTERNAL LEAK
DETECTION AND VISUAL
INSPECTION



Sahara[®] Leak Detection

Tethered Inline leak detection for accurate location of leaks and gas pockets

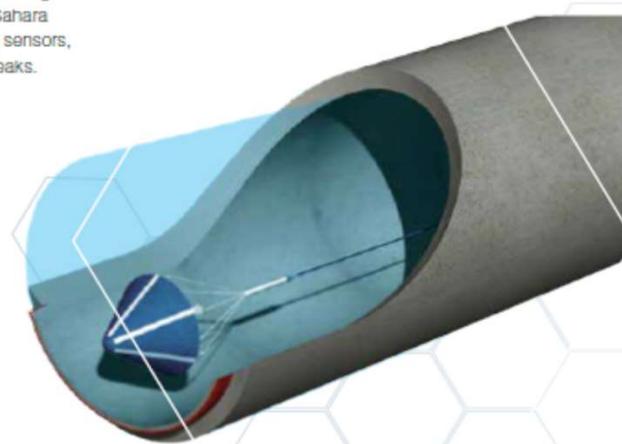
Sahara Technology

The Sahara platform is a tethered leak detection tool used to locate leaks and gas pockets in pressurized pipelines. The tool allows the operator close control and sensitivity during inspections with no disruption to regular pipeline service. The acoustic sensor is highly sensitive and is able to locate 'pinhole' sized leaks.

Leak detection surveys using the tool are completed while the pipeline remains in service by inserting the sensor into a live pipeline through a tap. A small parachute uses the flow of water to draw the sensor through the pipeline while it remains tethered to the surface. This allows for real-time results and maximum control; the tool can be moved back and forth using a winch system to confirm suspected leaks. Sahara leak detection is tracked above ground using sensors, which also allows for the precise marking of leaks.

Inspection Benefits

- Close operator control allows for real-time verification of leaks
- No disruption to regular pipeline service
- Reported accuracy rate of approximately 99 percent
- Highly sensitive acoustic sensor that can locate very small leaks (as small as 0.005 gal/min in optimal operating conditions)
- Inline video allows for pipeline mapping and inspection of live pipeline conditions
- Typical location accuracy within 1.5-feet





WELDING THREAD-O-LETS ONTO PIPE TO ALLOW TAPPING FOR PROBE ACCESS - PAYSON RD IN BELMONT



WELDING THREAD-O-LETS – GROVE PARK



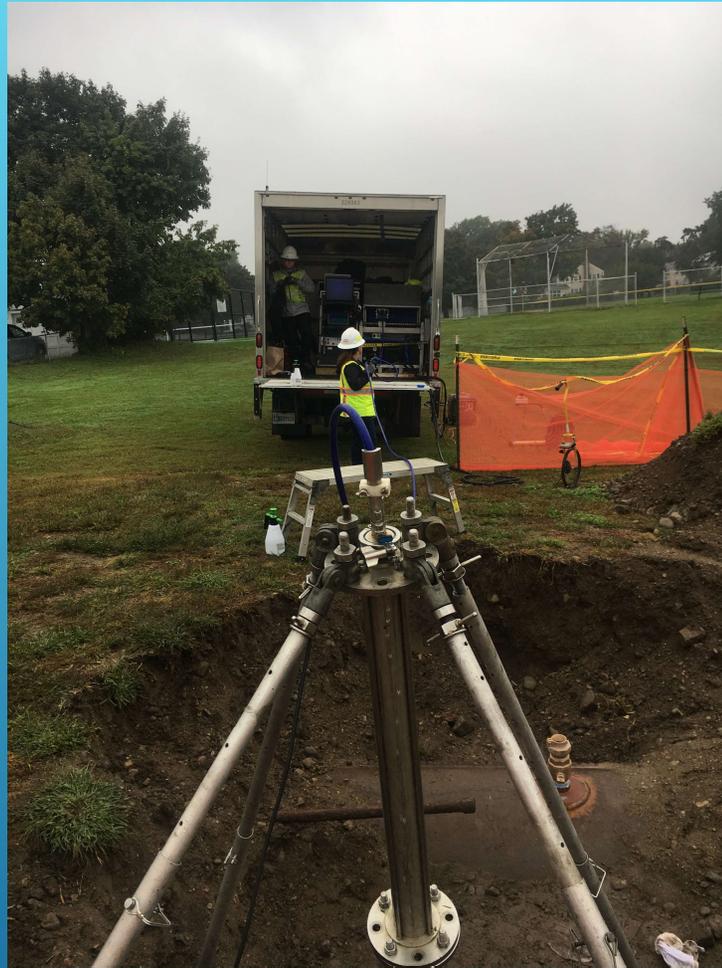
CWD CREWS INSTALLING CORPORATION VALVES FOR TAPPING MAINS



PURE CREW INSERTING FLOW METER INTO PAYSON LINES



PURE CREW SETTING UP FOR SAHARA LEAK
PROBE INSERTION – GROVE PARK BELMONT



INSERTING THE PROBE WITH PARACHUTE



LAUNCHING PROBE BEGINNING VISUAL
AND ACOUSTIC INSPECTION



SAHARA PROBE SETUP AND PIPE INSPECTION PAYSON ROAD BELMONT



SAHARA PROBE SETUP AND PIPE INSPECTION PAYSON ROAD BELMONT

Pure Technologies Leak Detection

Starting on October 1, 2018, Pure Technologies performed specialty acoustic leak detection with CCTV on both the influent and effluent lines of the twin 40-inch transmission mains. No leaks were found on either of the mains. Portions of the main between the Payson Park Reservoir and Grove Street Playground were found to have cement mortar lining materials floating in the line. At this time a draft report and video from Pure are pending